

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claim 1 (Currently amended): A method of forming a thermal barrier coating (26) on a surface of a component (10), the method comprising the steps of: step of

forming the thermal barrier coating (26) of a thermal-insulating material in which is contained elemental carbon and/or a gas that is insoluble in the thermal-insulating material, the elemental carbon and/or insoluble gas being within pores (32) that are within grains and at and between grain boundaries of the thermal-insulating material, the pores (32) establishing an open porosity within the thermal barrier coating (26); and then
partially sintering the thermal barrier coating (26) to close at least some of the pores (32) and entrap the elemental carbon and/or the insoluble gas within the closed pores (32), the elemental carbon and/or the insoluble gas being present in an amount sufficient to thermally stabilize the

microstructure of the thermal-insulating material.

Claim 2 (Currently amended): A method according to claim 1 wherein the forming step comprises co-evaporating carbon and the ~~and a~~ thermal-insulating material at an elevated temperature to deposit the elemental carbon within the pores (32).

Claim 3 (Original): A method according to claim 2, wherein the forming step comprises depositing the thermal barrier coating (26) by electron beam physical vapor deposition during which an ingot of the thermal-insulating material and an ingot of a carbon-containing or carbide-containing material are simultaneously evaporated.

Claim 4 (Currently amended): A method according to claim 1, wherein the forming step comprises depositing the thermal-insulating material to form the thermal barrier coating (26), and thereafter infiltrating the open porosity within the thermal barrier coating (26) with the insoluble gas, and wherein the sintering step closes ~~then heating the thermal barrier coating (26) to close~~ at least some of the pores (32) and entraps ~~entrap~~ the insoluble gas

within the closed pores (32).

Claim 5 (Original): A method according to claim 4, wherein the insoluble gas is at least one gas chosen from the group consisting of carbon monoxide, carbon dioxide, sulfur dioxide, nitrogen and argon.

Claim 6 (Original): A method according to claim 1, wherein at least some of the pores (32) entrap the insoluble gas, the pores (32) containing the insoluble gas being resistant to sintering, grain coarsening and pore redistribution.

Claim 7 (Currently amended): A method according to claim 6, wherein the insoluble gas is a carbon-containing gas that is entrapped by the sintering step during which heating the thermal barrier coating (26) is heated to a temperature sufficient to evolve the carbon-containing gas from the elemental carbon and prior to the sintering step closing ~~partially sinter the thermal insulating material to close~~ at least some of the pores (32).

Claim 8 (Currently amended): A method according to claim 7,

wherein the sintering heating step is performed at a temperature of at least 950°C.

Claim 9 (Original): A method according to claim 1, wherein the thermal barrier coating (26) comprises columnar grains (30).

Claim 10 (Original): A method according to claim 1, wherein the thermal-insulating material is yttria-stabilized zirconia.

Claim 11 (Currently amended): A method of forming a thermal barrier coating (26) on a surface of a component (10), the method comprising the steps of: ~~step of~~

forming the thermal barrier coating (26) at an elevated temperature by co-evaporating carbon and a thermal-insulating material to deposit elemental carbon in pores (32) that are within grains and at and between grain boundaries of the thermal-insulating material, the pores (32) establishing an open porosity within the thermal barrier coating (26); and then partially sintering the thermal barrier coating (26) to evolve a carbon-containing gas from at least some of the elemental carbon and then close at

least some of the pores (32) to entrap the carbon-containing gas within the closed pores (32), the elemental carbon and/or the insoluble gas being present in an amount sufficient to thermally stabilize - pores (32) within- the microstructure of the thermal-insulating material.

Claim 12 (Original): A method according to claim 11, wherein the forming step comprises depositing the thermal barrier coating (26) by electron beam physical vapor deposition during which an ingot of the thermal-insulating material and a second ingot of a carbon-containing or carbide-containing material are simultaneously evaporated.

Claim 13 (Original): A method according to claim 12, wherein the second ingot comprises graphite.

Claim 14 (Currently amended): A method according to claim 11
wherein the open porosity within the thermal barrier coating (26) constitutes at least 25 volume percent of the thermal barrier coating (26). wherein, as a result of the forming step, the thermal barrier coating (26) has a microstructure with pores (32) and sub-grain interfaces within, at and between grain

~~boundaries of the microstructure, the pores (32) establishing an open porosity within the thermal barrier coating (26) that constitutes at least 25 volume percent of the thermal barrier coating (26), at least some of the pores (32) containing elemental carbon and/or a carbon-containing gas, the elemental carbon and/or the carbon-containing gas being present in an amount sufficient to thermally stabilize the microstructure of the thermal insulating material.~~

Claim 15 (Currently amended): A method according to claim 11,
wherein 14, wherein at least some of the pores (32) entrap the carbon-containing gas, the pores (32) containing the carbon-containing gas are gas being resistant to sintering, grain coarsening and pore redistribution.

Claim 16 (Canceled)

Claim 17 (Currently amended): A method according to claim 11,
claim 16, wherein the sintering heating step is performed at a temperature of at least 950°C.

Claim 18 (Currently amended): A method according to claim 11,

wherein the sintering step forms ~~14 further comprising the step of heating the thermal barrier coating (26) to a temperature sufficient to evolve the carbon-containing gas from the elemental carbon and form~~ additional pores (32) that entrap the carbon-containing gas.

Claim 19 (Currently amended): A method according to claim 18, wherein the sintering ~~heating~~ step is performed at a temperature of at least 950°C.

Claim 20 (Original): A method according to claim 11, wherein the thermal-insulating material is yttria-stabilized zirconia and the thermal barrier coating (26) comprises columnar grains (30).

Claim 21 (Currently amended): A method of forming a thermal barrier coating (26) on a surface of a component (10), the method comprising the steps of:

depositing the thermal barrier coating (26) on the surface of the component (10), the thermal barrier coating (26) having a ~~has a~~ microstructure with pores (32) and sub-grain interfaces within, at and between

grain boundaries of the microstructure, the pores (32) establishing an open porosity within the thermal barrier coating (26);

vacuum infiltrating the open porosity of the thermal barrier coating (26) with a gas that is insoluble in the thermal-insulating material; and then partially sintering heating- the thermal barrier coating (26) to close at least some of the pores (32) and entrap the insoluble gas within the closed pores (32).

Claim 22 (Original): A method according to claim 21, wherein the insoluble gas is at least one gas chosen from the group consisting of carbon monoxide, carbon dioxide, sulfur dioxide, nitrogen and argon.

Claim 23 (Original): A method according to claim 21, wherein the depositing step is performed by electron beam physical vapor deposition.

Claim 24 (Currently amended): A method according to claim 21, wherein the sintering heating- step is performed at a temperature of at least 950°C.

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Claim 25 (Original): A method according to claim 21, wherein the thermal-insulating material is yttria-stabilized zirconia and the thermal barrier coating (26) comprises columnar grains (30).